

Ref. # 107

Clearwater N.F.

1935

Mr. Keen

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

FOREST INSECT SURVEY OF THE WHITE PINE STAND  
OF THE CLEARWATER NATIONAL FOREST  
AND  
CLEARWATER TIMBER PROTECTIVE ASSOCIATION  
-1938-

by  
Tom T. Terrell  
Scientific Aide

ANALYSIS OF SURVEY DATA AND RECOMMENDATIONS

by  
James C. Evenden  
Senior Entomologist

Forest Insect Laboratory  
Coeur d'Alene, Idaho  
November 8, 1938



**AIRMAIL**

File No.

Noted

*Mr. I. Kaen*

*1/10/38*  
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*1/10/38*

Refer to file  
Project C-3

Forest Insect Laboratory  
Coeur d'Alene, Idaho  
November 21, 1938

Dr. F. C. Craighead

Washington, D. C.

Dear Dr. Craighead:

I am forwarding by airmail two copies of our report covering the Clearwater situation. There is also enclosed copy of a letter to Mr. Koch, which is self-explanatory. Although I realize that I have departed from the regulations governing the submission of these reports, I feel that under the circumstances the action that I have taken was the best procedure to follow. Mr. Carter wrote to Mr. Koch by airmail requesting information concerning the Clearwater situation in order that they might make a definite decision relative to the allocation of control funds. I felt that I might as well let Mr. Koch have a copy of the report at this time as to tell him what findings we were recommending. However, I have attempted to stress in my letter of transmittal to Mr. Koch that my recommendations are subject to the approval of our Washington office. I sincerely trust that the action I have taken in connection with this matter will be satisfactory.

It seems that we are never able to get these reports out in time. Although I have been working on them, the prolonged field season, which was just completed last Saturday, prevented their submission, as we have been waiting for Mr. Terrell to finish the attached maps.

It would be appreciated if you would indicate your action concerning this report by wire.

Respectfully yours,

James C. Evenden  
Senior Entomologist

Enclosures



FOREST INSECT SURVEY OF THE WHITE PINE STAND  
OF THE CLEARWATER NATIONAL FOREST  
AND  
CLEARWATER TIMBER PROTECTIVE ASSOCIATION  
-1938-

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An extensive survey of the white pine stands of the Clearwater National Forest and adjacent timber lands of the Clearwater Timber Protective Association was instituted in September by the Bureau of Entomology and Plant Quarantine to determine the seriousness of existing bark beetle infestations. The project was under the direct supervision of the Forest Insect Laboratory at Coeur d'Alene, Idaho, with Tom T. Terrell in charge. Work started on September 7 and was completed on October 11, 1938. The crew of seven experienced men employed in the execution of the project covered more than 400 miles of sample-strip line, or approximately 3,350 acres.

Data concerning the seriousness of the mountain pine beetle infestation were obtained from sample strips one chain in width and approximately four miles in length, that were projected through all white pine stands. Although somewhat mechanically located, all available timber type data and the best judgment of the officers in charge were used in the plotting of these strips in order that the sample obtained would be representative of the area in question. Strip locations are plotted by compass bearings, which are roughly followed by the strip runners, who also pace the distance covered. Data obtained from these strips are recorded for each acre (10 chains) covered, which permits the location of the more seriously infested areas.



Funds were allotted by the Forest Service for the survey of the publicly owned lands, and by the Clearwater Timber Protective Association for the private holdings.

# STATUS OF MOUNTAIN PINE BEETLE INFESTATION AS REVEALED BY 1938 SURVEY

In the survey of this area the territory to be covered was divided into different working units. The infestation data from each of these units, with a brief discussion of the condition recorded, follow:

## CLEARWATER NATIONAL FOREST

### CEDARS UNIT

25,600 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
304	68	4955	.224	16.3

Percent of stand killed in 1938 = 1.37

Total number infested trees in unit = 5734

Nearly all of the timbered acreage in the Cedars unit is over-mature and heavily mixed with spruce and cedars. In the past both the white pine and spruce stands have suffered badly by insect kill, which has destroyed a large percentage of the stands. The areas within the Cedars unit are rough, brushy and rather inaccessible. The timber



stands are so isolated that it is thought that little use will ever be made of them and the only value they have must be considered as a watershed.

The present infestation of .22% infested tree per acre is high but is not thought to constitute a serious increase over 1937, as many 1937-killed trees are in evidence. The infested trees are heavily attacked and usually contain rather abundant broods, and they are felt to have an increasing potential.

Approximately 75 infested trees were counted along a recently completed road on Kelly Creek. Back blasting and other work which scarred many of the trees are no doubt responsible for the roadside infestation. The infested trees are in groups and are rather heavily attacked. The road will be much traveled in the future and the insect infestation will probably mar the scenic beauty of the drive if allowed to continue. Control measures for this roadside strip might be feasible; however, such work would have to be done annually for a period of years because many of the present green trees have been injured and will probably be attacked by insects in the future.

#### SKULL CRANE UNIT

6400 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
77	1	1	.013	26.7



Percent of stand killed in 1938 = .2%

Total number infested trees in unit = 333

A normal infestation was found in the Skull Creek drainage. The timber stands are all on north exposures and are largely mature stocking.

QUARTZ CREEK UNIT

9600 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New Attacks	Green trees	New attacks	Green trees
105	5	3719	.048	35.4

Percent of stand killed in 1938 = .13%

Total number infested trees in unit = 461

Only a very light infestation was recorded in the white pine stands of Quartz Creek. The timber is all on a north exposure and is of mature stocking. The stands are heavily mixed with cedar, which indicate a very moist site.

Evidence of looper defoliation is noticeable on all the higher ridges in alpine type. Such areas, although not examined closely, are believed to be comparable to the defoliation on Sheep Mountain in the Canyon unit.

SHEEP MOUNTAIN CREEK UNIT

2580 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
76	75	3688	1.026	48.5

Percent of stand killed in 1938 = 2.1%

Total number infested trees in unit = 2954



The Sheep Mountain Creek unit lies in the Canyon Ranger District of the Clearwater National Forest. The area includes part of the head of the Dead Horse and part of the Sheep Mountain Creek drainage.

While the infestation is quite severe, the broods are not believed to be so heavy as in the Tapes Creek unit, which lies to the south. In quite a number of the infested trees brood mortality was very noticeable and in some instances no brood remained alive in the base of the trees, although the tops were still green.

Although a number of groups were found, the majority of the infested trees occurred singly. It is the writer's opinion that the infestation will not increase greatly in this unit.

#### DEAD HORSE MOUNTAIN UNIT

1280 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
19	3	221	.158	11.6

Percent of stand killed in 1938 = 1.3%

Total number infested trees in unit = 202

The Dead Horse unit lies to the east of the road in the vicinity of Dead Horse Mountain. The timber is mostly in the creek bottoms and is largely mixed with alpine type. The infestation occurs largely as single infested trees and is not felt to be serious. Several large groups of infested Douglas fir were seen in the unit.



TEPES CREEK UNIT

1280 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
50	39	1890	.780	37.8

Percent of stand killed in 1938 = 2.1%

Total number infested trees in unit = 998

This unit contains a very heavy stand of white pine in the 140- to 180-year age class. The stand is apparently very vigorous and healthy, but it has suffered severe insect losses for the past 10 years. Approximately 20 percent of the original stands has been killed by insects during that time.

Groups of 4 and 5 1938-infested trees were examined. Although some evidence of root fungus was found, apparently it is not a serious factor. The infested trees are heavily attacked (averaging approximately 18 per square foot) and contain very heavy broods of mostly midsummer attacks.

About one section of the timber in this drainage is in the Clearwater Timber Protective Association holdings and contains an estimated 365 infested trees. The two areas have a total of 1,920 acres, on which there is an estimated 1,362 infested trees.

CANYON CREEK UNIT

13,000 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
195	13	3554	.067	18.2



Percent of stand killed in 1938 = .36

Total number infested trees in unit = 871

The insect infestation in white pine throughout this area is believed to be in a normal status. Groups of insect-killed Douglas fir were seen that contained 15 to 25 trees, indicating a general killing out of this species on drier sites.

An infestation of looper which has defoliated alpine type over rather large areas is general on practically all the high ridges. The defoliation is not as severe as occurred in similar areas in 1937 and it is not thought that a very high percentage of the stand will be killed.

OROGRAND UNIT

22,400 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
456	41	14973	.089	32.8

Percent of stand killed in 1938 = .27%

Total number infested trees in unit = 1993

The white pine on this unit occurs in very heavy thrifty stands. These stands are lightly infested in percentage of standing timber. However, as the timber is so dense, the total infested trees per acre seems rather high. The area of heaviest infestation occurs in sections 29, 30, 31, and 32, T<sub>6</sub> 36 N., R. 7 E., where the infested trees ran about .4 per acre. The timber is so heavily stocked that this amounts to less than one-half of one percent of this stand, which is not believed to be a serious condition.



Several infested trees examined by Mr. Bedard proved to average subnormal breed and all were infested with root fungus.

#### WASHINGTON CREEK UNIT

3540 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees:
109	22	2865	.202	26.3

Percent of stand killed in 1938 = .76%

Total number infested trees in unit = 776

The Washington Creek unit includes all the white pine stands south and east of the road between the forest boundary and trail 204, south of Dead Horse lookout.

The stand is very heavily stocked with a young stand of apparently thrifty timber. The present infestation, while rather high in trees per acre, does not affect a serious percentage of the stand.

It is felt that in such heavily stocked areas, where the trees do not often occur in groups, the infestation is in the order of a natural thinning condition. However, such infestations are always potentially dangerous and should be closely watched.

#### MUSKELSHILL UNIT

32,000 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees:
346	13	4302	.038	12.4



Percent of stand killed in 1938 = .36

Total number infested trees in unit = 1216

Except for a few trees infested along road right-of-ways, the timber stands of the Musselshell unit were practically free from insect infestation.

Although no sample strips were run in a timbered area south of the Fete Forks lookout because of poor road conditions, an inspection trip was made into the area. No red tops or infested trees were seen and it is felt that the entire Musselshell area is in a normal condition.

Past insect kill is very noticeable, especially in areas of lodgepole pine. It is believed that all the kill seen occurred about 10 years ago.



# CLEARWATER TIMBER PROTECTIVE ASSOCIATION

## HEADQUARTERS UNIT

46,000 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
342	35	7645	.102	22.3

Percent of stand killed in 1938 = .46%

Total number infested trees in unit = 4692

In the Headquarters unit the infestation is nearly normal in all but a small area in the head of Silver Creek, section 17 and 18, T. 39 N., R. 5 E., where one group of 20 infested trees was found. The trees are largely early summer attacks, with broods in the advanced larval, pupal and new adult stages. Only one large group was seen and it is believed that the infestation is confined to a relatively small area.

## PIERCE UNIT

19,000 Acres

Acres of sample strip	Trees on strip		Trees per acre of strip	
	New attacks	Green trees	New attacks	Green trees
180	14	3779	.077	21.0

Percent of stand killed in 1938 = .37%

Total number infested trees in unit = 1463

Only one area of above-normal infestation was found in the Pierce unit. The area is largely in sections 26 and 35, T. 37 N., R. 5 E., just north of Pierce, Idaho. The infestation is in large overmature trees and occurs in small groups. The trees are heavily attacked and have a long infested length. Practically all of the infested trees are badly infected with root fungus, which is visible above the root collar. The infestation does not seem to be increasing but has evidently maintained a steady high annual kill for the past several years, which has killed from 25 to 50 percent of the stand in spots.



# TEPEE UNIT

640 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees
14	8	479	.57	34.2

Percent of stand killed in 1938 = 1.7%

Total number infested trees in unit = 365

This area lies to the west and is just across the forest boundary from the Tepee Creek unit on the national forest. The area consists of scattered areas of white pine in the heads of several small creeks that are tributary to Tepee Creek. The stands in these small areas are not as heavy and consequently are not quite as heavily infested as those in the national forest area.

# WASHINGTON CREEK UNIT

20,000 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees
209	33	6054	.158	29.0

Percent of stand killed in 1938 = .54%

Total number infested trees in unit = 3160

Although the infestation in the Washington Creek unit is scattered throughout the area, it is more severe in the areas of heavier timber. Groups of 7 and 8 infested trees are found, which indicates an infestation of a rather severe type. The infested trees are largely late summer attacks with rather heavy broods. Although a number of 1937-killed trees were seen, there seems to be a definite increase over the infestation of 1937.



OROGRANDE UNIT

16,600 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees:
189	6	4216	.032	22.3

Percent of stand killed in 1938 = .14%

Total number infested trees in unit = 531

There is a very light infestation in the white pine stands throughout the Orogrande unit. The infestation seems only a normal condition, with apparently little change from last year. There is, however, an infestation in lodgepole pine in the lodgepole stands west of the Oxford ranger station. Groups of infested trees up to fifteen were seen in this area and, although the stand contains white pine, there seems to be little or no infestation.

It is believed that a change of type is taking place where the lodgepole is being crowded out. A similar change has taken place in the Shanghi Creek drainage, where practically all of the lodgepole pine has been killed in the past ten years. The killing agent in the Shanghi drainage was the mountain pine beetle, but very little white pine was killed at the time and the infestation ended when the lodgepole stands were exhausted.

MUSSELSHELL UNIT

16,600 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees:
237	3	2538	.013	10.7

Percent of stand killed in 1938 = .12%

Total number infested trees in unit = 216



The infestation in the Musselshell unit is normal except for a few trees along the road that were infested subsequent to slash disposal measures.

**BERTHA HILL UNIT**

43,500 Acres

Acres of sample strip:	Trees on strip		Trees per acre of strip	
	New attacks:	Green trees:	New attacks:	Green trees:
364	44	9544	.121	26.2

Percent of stand killed in 1938 = .46%

Total number infested trees in unit = 5263

The stand throughout this unit varies greatly in age types. About 20 percent of the area is covered with overmature timber and in these overmature stands the largest number of infested trees were found. A high percentage of the infested trees are decadent with root fungus and are believed to have little resistance. It seems to be a condition where the stand has passed its peak of vigor and is steadily being killed by insect attacks. The infestation shows no signs of increasing but seems to be destroying a relatively high percentage of the stand annually.

The greatest infestation per acre occurs in Beaver Creek in recently logged areas where large numbers of trees were scorched by light ground fires. These weakened trees are largely attacked by secondaries, but about 20 percent of them have light mountain pine beetle broods as well. In some of the selective logging areas as much as 20 percent of the remaining stand has been killed by a fire and insect combination in the



past year. Two sample strips (36 and 37) in the Sheep Mountain Creek drainage just west from the national forest boundary recorded approximately one infested tree for every two acres. This area lies west and adjacent to a serious infestation on the Sheep Mountain Creek unit on the national forest.

#### WHISKEY CREEK UNIT

6300 Acres

Acres of sample strip	Trees on strip			Trees per acre of strip		
	New attacks	Green trees		New attacks	Green trees	
	l.p.	w.p.		l.p.	w.p.	
115	2	1	1857	1.017	.009	16.1

Percent of stand killed in 1938 = .09%

Total number infested trees in unit = 141 lodgepole pine  
75 white pine

The western edge of this unit borders on the breaks of the Clearwater River, where the timber type changes from white pine to yellow pine. A large part of the area has been logged over a long period of years and logging operations are still in progress. The area is slightly rolling with open meadows and low ridges. The timber is rather young and seems to be quite free from insect infestation.



**SUMMARY TABULATION OF THE 1938 INVESTIGATION  
OF THE MOUNTAIN PINE BEETLE IN WHITE PINE**

Unit	Acres	New attacks	Green	Stand killed	Percent of	Total number of
CLEARWATER NATIONAL FOREST						
Sheep Mountain	2,880	1.026	48.5	2.1		2994
Tepes Creek	1,280	.780	37.8	2.1		998
Cedars	25,600	.224	16.3	1.37		5734
Washington Creek	3,840	.202	26.3	.76		776
Dead Horse	1,280	.158	11.6	1.3		202
Orogrande	22,400	.089	32.8	.27		1993
Canyon Creek	13,000	.067	18.2	.36		871
Skull Creek	6,400	.052	26.7	.20		333
Quartz Creek	9,600	.048	35.4	.13		461
Musselshell	32,000	.038	12.4	.3		1216

**CLEARWATER PINE PROTECTIVE ASSOCIATION**

Tepes Creek	640	.57	34.2	1.7		365
Washington Creek	20,000	.158	29.0	.54		3160
Bertha Hill	43,500	.121	26.2	.46		5263
Headquarters	46,000	.102	22.3	.46		4692
Pierce	19,000	.077	21.0	.37		1463
Orogrande	16,600	.032	22.3	.14		531
Musselshell	16,600	.013	10.7	.12		216
Whiskey Creek	8,300	.009	16.1	.05		75



# COST ANALYSIS 1938 SURVEY

Project started September 7 and was completed October 11, 1938.

Effective man days	---	131	
*Non-effective man days	---	131	
Supervision	---	<u>31</u>	
Total man days	---	293	
Miles of sample strip	---	424	Acres of sample strip --- 3,387
Total acreage of territory surveyed	---	288,980	

## Expenditures:

Subsistence	\$ 143.24
Transportation	124.84
Wages (includes cook)	1271.99
Miscellaneous	<u>2.00</u>
	\$1522.07

Cost per effective man day	---	\$11.62
Cost per total man day	---	\$5.19
Cost per acre of strip	---	\$0.449
Cost per acre of area covered	---	\$0.0053

\*Missing 29, rain 6, Sundays and holidays 66, cook 30.



## ANALYSIS OF SURVEY DATA AND RECOMMENDATIONS

by  
James C. Evenden  
Senior Entomologist

The data secured by the 1938 survey reveal the presence of a mountain pine beetle infestation of varying degrees of severity, distributed throughout the white pine stands of the Clearwater National Forest and adjacent holdings of the Clearwater Timber Protective Association. This infestation is not new, as surveys conducted in 1934 and 1935 disclosed its presence, and the countless snags which may be seen in all white pine stands substantiate this position. No attempt was made to determine the losses that have occurred in mature white pine stands during the past quarter century; however, if these data were available, the volume would be in excess of that anticipated. It is true that in young, overstocked white pine areas the loss of a portion of the stand can be considered as a desired thinning tending to produce optimum growth conditions and a maximum yield. However, when these losses exceed the requirements of thinning, or occur in the destruction of solid groups of trees, the volume of the trees killed plus the increment that would have accrued during subsequent years become a direct charge against the final yield. In the mature white pine stands of the Clearwater National Forest and adjacent private holdings the losses that have occurred during the past few decades can be considered as having materially reduced the ultimate yield of these areas. Unfortunately, snags of insect-killed trees have been considered as an integral part



of a white pine forest. But little consideration has been given to the relation of this reduction in the final yield of white pine to the economics of the logging operation and necessary carrying charges, or to the relation of a continuous supply of snags to the fire problem both prior and subsequent to cutting. To properly evaluate the destruction of mature white pine by bark beetles, all phases of the problem must receive proper consideration if the correct answer is to follow.

#### Present Status of the Mountain Pine Beetle Infestation

As previous surveys were made of the Clearwater National Forest and Clearwater Timber Protective Association holdings in 1934, and of the Clearwater National Forest in 1935, a comparison of these data with those obtained during the 1938 season is necessary.

#### Clearwater National Forest

Name of unit	Acres	Trees killed			Change in status: Percent		Killed trees per acre	% of stand killed
		1934	1935	1938	1935	1938	1938	1938
Musselshell	32,000	2614	1137	1216	-56	+6.9	.038	.30
Oregrande	22,400	3654	2511	1993	-31	-20.6	.089	.27
Cedars	25,600	6426	1577	5734	-75	+263.6	.224	1.37
Canyon*	15,880	3328	512	3825	-85	+647.1	.067	1.28
Quarts	9,600	439	251	461	-43	+83.6	.048	.13
Tepee**	6,600	852	2529	2066	+197	-18.2	.780	1.28

\*Includes the Sheep Mountain Unit as shown in the 1938 data.

\*\*Includes the Washington and Dead Horse Units as shown in the 1938 data.



# Clearwater Timber Protective Association

Name of unit	Acres	Trees killed		Change in status Percent	Killed trees per acre 1935	Percent of stand killed 1935
		1934	1935			
Musselshell:	16,600:	7,355:	216:	-97.0:	.013	.12
Pierce	19,000:	12,545:	1,463:	-88.3:	.077	.37
Headquarters	46,000:	1,983:	4,692:	+136.6:	.102	.46
Washington Creek*	20,000:	7,331:	3,525:	-51.9:	.158	.54
Bertha Hill:	43,000:	7,520:	5,263:	-30.0:	.121	.46
Whiskey Cr.:	43,500:	3,249:	141:	-95.6:	.009	.05
Orogrande	16,600:	5,479:	531:	-90.3:	.032	.14

\*Includes the Teepee Creek Unit of the 1935 data.

The units shown in the preceding tables are as considered in the 1934 and 1935 surveys. In the 1935 survey these units were broken into smaller areas, as explained by the footnotes. The acreages figures are as used in the 1935 survey, and are for the most part confined to white pine types only.

From the preceding tables it will be seen that there has been no uniform trend in the changes of the infestation between the 1935 and 1938 surveys. In some areas there has been a marked reduction in the seriousness of the infestation, while in others there has been a material increase. In the Cedars, Canyon, and Teepee Creek units of the Clearwater National Forest there are serious infestations that during the past season destroyed more than one and one-fourth percent of the residual



stand. On the units of the Clearwater Timber Protective Association there are no serious infestations at this time, with the exception of that portion of the Washington Creek unit lying within the Tepee Creek drainage. However, on the Headquarters, Washington, and Bertha Hill units the 1938 loss amounted to more than  $\frac{1}{2}$  of 1 percent of the present timber stand.

### 1938 SITUATION

Within the white pine stands of the Sheep Mountain, Tepee Creek, and Cedars Units of the Clearwater National Forest there are infestations of the mountain pine beetle that are not only serious at this time but under normal conditions will increase in severity in 1939. The trees that are being attacked are healthy normal individuals, with heavy 1938 broods of the attacking beetles. The present situation on these units is shown in the following tabulation.

Name of unit	Acres	Infested trees per acre	Total infested trees	Percent of stand killed 1938
Sheep Mountain	2,880	1.026	2954	2.10
Tepee Creek (C.N.F.)	1,280	.780	998	2.10
Tepee Creek (C.T.P.A.)	640	1.700	365	1.70
Cedars	25,600	.224	5734	1.37

#### Sheep Mountain Unit

Although the infestation within this unit does not indicate a very great increase during the coming season, it is sufficiently serious to warrant the institution of control in order to prevent the rapid depletion



of the stand that is now occurring. Regardless of the rather heavy stocking of merchantable timber now present on this area, the continued destruction of this stand will in a few years place it in an unmerchantable condition.

#### Tepes Creek Unit

It is estimated that during the past ten years at least 80 percent of the original stand has been killed by the mountain pine beetle. This estimate, which is believed to be conservative, would indicate that the loss during this period has at least averaged the 1938 destruction, or 2.1 percent of the stand. Furthermore, the trees that are being attacked are healthy and vigorous, with the broods of beetles indicating an increase during the coming season. The infestation on this unit, as well as the Tepes Creek unit of the Clearwater Timber Protective Association, more than warrants the institution of control.

#### Cedars Unit

The infestation within this unit presents a rather complicated situation. The white pine stands are overmature, with associated timber species apparently predominating the present stocking of the area. This fact is evidenced by the rather small number (16.3) of merchantable trees remaining, which also supports Mr. Terrell's statement that a large percentage of the white pine trees has already been killed by insects. As the white pine occurs in isolated bodies of timber in rough, brushy, and rather inaccessible territory, it is possible that the greatest values of these forests within this unit may rest in watershed



protection. If this is true, then white pine is of no greater value than the associated species.

Although the infestation within this unit is quite heavy, there was not a very marked increase over the previous season's loss, as indicated by the number of 1937-killed trees. Judging from the character of the 1938 attacks, one may be reasonably assured that the 1939 loss will be at least equal to that of the past season.

Mr. Ferrell has described the infestation along Kelly Creek and the reason for its concentration. He has stated that if the scenic values of the timber stand along this road are to be preserved it will be necessary to institute a program of control for this immediate area that will need be carried on for a period of three or four years.

#### RECOMMENDATIONS

In considering the institution of control within the Clearwater National Forest, the unfavorable road conditions which exist in early spring make the question of transportation an important consideration. However, in the event that funds are made available for this project it would seem that this problem could be overcome.

It is therefore recommended that control measures be instituted within the Sheep Mountain and Tepee Creek units, as well as the Cedars, if the white pine within that unit is of sufficient value to warrant protection. On the Sheep Mountain and Tepee Creek units there are



some 4,317 trees that will require treatment. It is estimated that this work will cost approximately \$6.00 per tree, or a total of \$25,900.

If protection is desired for the white pine stands along the Kelly Creek Highway, an additional allotment of \$500 will be necessary, as there will be approximately 75 to 100 trees to treat. However, it is possible that some of this timber might be salvaged.



Land District. Mag. Declin.

Area

Acres

**Clearwater National Forest**

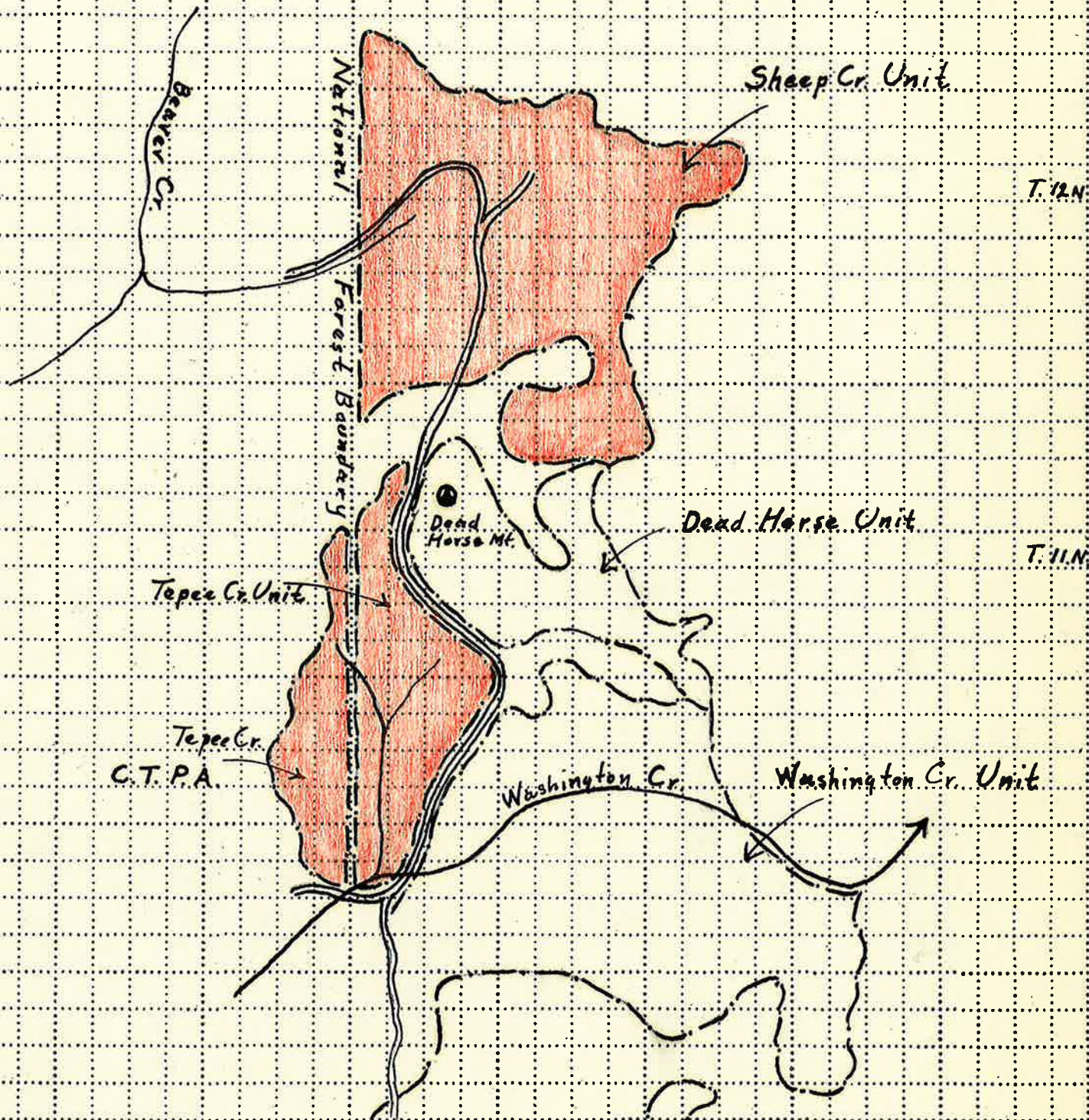
T. 11Y12NR. 7E.

Mer. Scale 1 inches = 1 mile

(Case designation.)

(Subdivision and section.)

## SKETCH MAP OF AREAS FOR WHICH CONTROL IS RECOMMENDED



Field work by \_\_\_\_\_, Date \_\_\_\_\_, Platted by \_\_\_\_\_

Remarks: \_\_\_\_\_

Approved \_\_\_\_\_, 19\_\_\_\_

(Approving officer.)



